What Is “Reverse” Translational Research in Anatomy?

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Translational research attempts to apply basic science research to patient care. However, the researchers performing this method of investigation are often disconnected from direct patient care. Therefore, sometimes, the focus of the research can be tangential or so general that long lengths of time are required before the results might reach the patient. As coined by us, “reverse” translational research identifies a surgical or clinical complication or problem and attempts to engineer a solution via a better understanding of the anatomy and via cadaveric dissection. In other words, with this method, usually, the practicing clinician or surgeon brings the problem to the anatomist who then designs a project and performs the research. This is different than the typical anatomical research where anatomists, whether clinicians or not, develop research projects that are not derived from a current, typical, or relevant patient problem for example, prevalence of an anatomical variant. It is our belief that such studies can also be developed after engaging and consulting practicing physicians and surgeons and identifying day-to-day problems in their practice. For example, a surgeon might consult the anatomist regarding a recent surgical complication and the two then develop an anatomical study that addresses the complication and that potentially might result in a novel change to surgical technique that could avoid the identified complication.

We have used a reverse translational research paradigm with anatomical studies over the past 25 years to first identify clinical problems and then devise potential anatomical solutions. Many of these studies (new autologous anatomical structures used for bone fusion, nerve grafts, or new invasive or surgical approaches) have been cadaveric feasibility studies. This research paradigm has included anatomical feasibility studies that have then gone on to be used clinically or surgically. Cadaveric feasibility studies sometimes demonstrate a surgical principle that in our experience, can influence surgical practice, that is, direct surgeons to an improved technique. For example, we recently evaluated many of our published cadaveric feasibility studies and searched the literature to find surgeons from around the world who had used such ideas on their patients. Compared with the average time of 17 years for typical translational research to be used in patients, our evaluation found that cadaveric feasibility studies can much more quickly influence patient care with an average time from the publication of the cadaveric study to the publication of this study with patient outcomes of roughly 3 years.

Unfortunately, anatomical studies are often performed by nonclinicians or physician anatomists who are disconnected from clinical practice and therefore the direct impact on clinical care can be limited. In our opinion, the best clinical anatomical studies arise from problems that face clinicians and surgeons on a daily basis in their practice. Therefore, working and collaborating with physicians and surgeons will better aid the anatomical researcher in focusing their studies so that they have the most potential in helping patients with the most up-to-date and relevant anatomical studies.